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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,669	10/28/2003	William Lawrence Whittaker	03-511-US	6830

7590 04/05/2005

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EXAMINER	
TAYLOR, VICTOR J	
ART UNIT	**PAPER NUMBER**
2863	

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/696,669	WHITTAKER ET AL.	
	Examiner	Art Unit	
	Victor J. Taylor	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Office Action*.

DETAILED ACTION

Drawings

1. The drawings submitted on October 23, 2003 are objected to under 37 CFR 1.83 (a) because of the poor print quality with the dark images and the hand drawn lettering and numbering that are not to the standard size and requirements. The drawings are informal and suitable for examination only and formal corrected drawings are required.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. Claims 14 and 16-20 are objected to because of the following informalities:

Claim 14 is a method claim with the steps drawn to computer data image processes processing and data gathering for mapping the open space in the mining tunnel defined as the "void". Claims 14 to 20 comprise the mechanical apparatus found on the imaging robot 10 in figure 2 and defines the apparatus and the equipment that are incorrectly dependent of the method computation modeling processes claim method steps for mapping as found in claim 14. Appropriate correction is required.

Prior Art

3. The prior art made of record and not relied upon is considered pertinent to applicant:

I. Hinton et al., in US 6,608,913 in class 382/104 is cited for the self-contained mapping and positioning system utilizing point cloud gray scale data for mapping underground mining that is capable of mapping the topography of a region such as a mine tunnel440 or the subterranean void of the mining tunnel in figure 3. And discloses the mine tunnel outline plan views (TOPES) imported into the CAD package to produce the mine tunnel void and views in lines 15-25 and discloses the robotic techniques with dependable mapping, navigation and positioning systems in lines 30-45 of column 1. He further discloses the robotic mapping and imaging of mining tunnels and subterranean tunnel void and the robotic tunnel vehicle in lines 35-49 of column 2. He further discloses the elements for independent claims 1 and 14, which encamps the limitations for the claimed elements in the instant application in lines 1-65 of column 3 and column

4 in combination with the completed document. He further discloses the data processing means 58 connected to the 3-D laser scanner 52 and uses conventional processes and modeling software and cites the use of the "3DIPSOS tm" and using the "SOISIC tm" sensors and NTSC video cameras in lines 55-65 of column 4.

II. Merriam Webster's Collegiate Dictionary in the Tenth Edition and numbered ISBN-0-87779-709-9 published 12-1997 defines the term "void" as b: an empty space. The applicant defines the term "void" for hollow structures to include the tunnels and the natural or the dug structures such as the caves or the mines in man-made subterranean structures in lines 1 to 3 on page 2 of the specification. As found in the claim limitations the term for "void' and defined by Webster could include any void including the void for open intergalactic space that is void of any matter such as air, or gas, or solid, or liquid or combinations thereof.

So, now for the purpose of the examination before the examiner the term for the "void" as defined by Webster above and the broad term for the "subterranean void" as found in clam 1 is to include the mining tunnel open space as defined in the specification. And the term for the "mapping the interior surfaces of a void" as found in claim 14 to include the mining tunnel "open space face wall" as defined in the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) The invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Cunningham in US Patent 6,349,249.

With regard to claim 1, Cunningham discloses the autonomous robotic wheeled mapping vehicle 12 in the mine tunnel void 16 and mapping the interior surface 16 of the subterranean void 32 in figure 2.

He discloses the limitations as claimed:

The void mapping robot autonomous vehicle 12 inserted into the void in figure 3 and the sensors 26, laser scanners 28 and range finders 30 and wheeled mobile vehicle 12 with the computation processes 20 in figure 1.

He further discloses the wheeled vehicle 12 inserted into the subterranean tunnel void 16 and discloses capturing the local range data 28 at a position on the void mapping robot 12 by the CPU in figure 1.

He further discloses moving the robot vehicle to a series of places within the tunnel void 12 using alignment bearing in lines 1-5 of column 3.

And further discloses capturing a plurality of second range data by periodically stopping the robot vehicle 12 to take more appropriate measurements 28 in line 5 in the subterranean void 16.

And discloses incorporating the plurality of multiple second range data into the full data map 20 in lines 10-60 of column 3 and combined with figure 1, figure 2, figure 3 and imaging apparatus 10 with the vision system processor 24 in line 53 of column 4.

Re claim 2, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2. The deployment of the vehicle would inherently require inserting the vehicle 12 into the mining tunnel void 16 and the deployment would inherently include the maintenance of the vehicle with the steps for stowing or moving the vehicle to or from or within the survey site and the tunnel void as commonly found in engineering operation and maintenance. For example see the Hicks Standard Handbook of Engineering Calculations. The1976 second edition provides standard maintenance and storage requirements for imaging vehicles. He further discloses the void mapping robot vehicle 12 moving in the tunnel in the interior of the subterranean void 16 which is deployed by the motored toping apparatus 10 mounted on the self-propelled platform robotic vehicle 12 see figure 2 and figure 3 and lines 30-50 column 2.

Re claim 3, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2. He discloses the deflating part 14 mounted on the robot vehicle 14 in figure 2.

Re claim 4, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2. He discloses the video camera 26 deployed on the robot 12

with the folding and moveable positions that meets the requirements for unfolding at least part of the void mapping robot 26 out of the interior portion of the void mapping robot 12 in figure 3.

Re claim 5, which stands rejected on the rejected base claims, He further discloses the mobile-wheeled 14-robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2. He discloses the void mapping robot 12 included the robot platform 10, which is docked on the autonomous robot vehicle 12 in figure 3.

Re claim 6, which stands rejected on the rejected base claims, He further discloses the mobile wheeled 14 robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 and discloses width and height 2-D video capture 26.

Re claim 7, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 and discloses the automatic scan 10 doing toping measurements and alignment bearing and slowly driven with the apparatus periodically stopping to do new measurements in line 5 of column 3.

Re claim 8, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 and discloses the gray measuring scale looking for identified edges see figure 4 with computations for distance measurements using differential equation X-Y off set distance boundary measurements in lines 1-10 of column 6.

Re claims 9 and 10, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 and computations performed autonomously by the robot CPU 20 in figure 1 whit steps for comprising a bored hole in the sub terrain earth with the autonomously robot inserted there in with a plurality of separate tunnel borehole inter connected for explorative measurement and insertion of the robot depicted in figure 4.

Re claims 11-13, which stands rejected on the rejected base claims, Cunningham discloses the method as claimed. The method steps in the claims that merely recites movement and calculation performed autonomously by the robot, and egression the mine void space, and computer computations on the data and capturing sensor data and post processing full map data and using the disclosed features together is inherent to the disclosed structure and computational processes 20 figure 1. For example see the Hicks Standard Handbook of Engineering Calculations (1976 Second Edition)

With regard to claim 14, Cunningham discloses the autonomous robotic wheeled mapping vehicle 12 in the mine tunnel void 16 mapping the interior surface 16 of the subterranean void 32 in figure 2.

He discloses the limitations as claimed:

The CPU 20 for storage and processing digital data 28 collected with the scanner 28 and the vision system 26 and processor 24 of the mining open space void in the mining tunnel 16 depicted as the void in the claim limitation in figure 1.

The void mapping robot autonomous vehicle 12 inserted into the void in figure 3 and the sensors 26, laser scanners 28 and range finders 30 and wheeled mobile vehicle 12 with the computation processes 20 in figure 1.

He further discloses steps for determining a mode of exploration using the positioning system 18 in lines 30-40 of column 3.

He further discloses initial mobility of the wheeled vehicle 12 inserted into the subterranean tunnel void 16 and discloses capturing the local range data 28 at a position on the void mapping robot 12 by the CPU in figure 1.

And discloses computations to model the TOPE map in figure 5 developed from data collected by CPU 20 and processed with Waltz software for display in lines 1-35 of column 9.

He further discloses utilizing additional sensors 26 to gather environmental information about the interior of the open mine space cavity and moving the robot vehicle to a series of places within the tunnel void 12 using alignment bearing in lines 1-5 of column 3.

And further discloses updating the data in the CPU 20 and capturing a plurality of second range data by periodically stopping the robot vehicle 12 to take more appropriate measurements 28 in line 5 in the subterranean void 16.

And discloses the robot 10 in the tunnel space 16 egressing along the mine tunnel floor with the capability to move into or move out of the mining tunnel 16 in figure 1 with telecommunications with the monitor 22 at the remote location in lines 25-32 of column 4.

Re claim 15, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2. The deployment of the vehicle would inherently require inserting the vehicle 12 into the mining tunnel void 16 and the deployment would inherently include the maintenance of the vehicle with the steps for stowing or moving the vehicle to or from or within the survey site and the tunnel void as commonly found in engineering operation and maintenance. For example see the Hicks Standard Handbook of Engineering Calculations. The1976 second edition provides standard maintenance and storage requirements for imaging vehicles. He further discloses the void mapping robot vehicle 12 moving in the tunnel in the interior of the subterranean void 16 which is deployed by the motored toping apparatus 10 mounted on the self-propelled platform robotic vehicle 12 see figure 2 and figure 3 and lines 30-50 column 2.

Re claims 16-18, which stands rejected on the rejected base claims, Cunningham further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 and discloses the method as claimed. The method recites a choice of mechanical options chosen together is inherent in the design structure. Cunningham discloses tires 14 on the robot used to propel the robot down the mining tunnel 16 and adaptable with selections of mechanical appendages to mimic fins and propellers as commonly found in swamp buggy tires and most mud tires as selectable desired on the mechanical design criteria.

Re claim 19, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the range imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 and discloses the laser range finder 30 in figure 1.

Re claim 20, which stands rejected on the rejected base claims, He further discloses the robot vehicle 12 with the imaging apparatus 10 deployed in the mining tunnel void 16 of figure 2 with the means found in the CPU 20 of figure 1.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 571-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

V. J. Taylor
24 March 2005.

John Barlow
Supervisory Patent Examiner
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